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TRICKLE MOUNTAIN Forage Allocation Research

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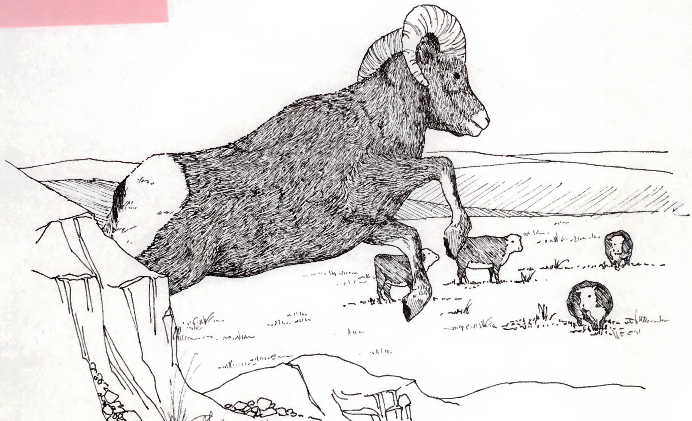

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Dr. Allen Cooperrider - BLM Wildlife Research Biologist

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PROGRESS REPORT: TRICKLE MOUNTAIN RESEARCH STUDY

Contract No. YA-512-CT8-22

May 15, 1979

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I. ABSTRACT

This report summarizes work on the Trickle Mountain Research Contract (Contract No. YA-512-CT8-22) from October 1, 1978 through March 31, 1979. Field work continued throughout this period. The winter weather was more severe than during the previous winter with prolonged cold weather and deep snow. The pattern of habitat use was similar, however, except that animals were more concentrated and on winter range for a longer period of time. Fecal samples have been collected at 2 week intervals from all wild ungulates for the entire period as well as from all domestic livestock on the range. One year's (January-December 1978) worth of samples have now been analyzed in the Composition Analysis Laboratory at C.S.U. All wild species are relying on browse species, especially fringed sage, throughout most of the year, although bighorn sheep and elk ate substantial amounts of grass in spring and summer. Utilization of forbs appears to be low at all times of year. Diets of livestock, both horses and cattle, consisted primarily of grasses and winterfat although other browse species were found in significant amounts in the fall. Comparison of cattle food habits on adjacent allotments suggests that diets may be quite site specific and that regional food habit data may not be a good predictor of what an animal is eating on a particular area.

II. OBJECTIVES

A. Overall Program Objectives:

To determine use of and competition for forage by livestock, mule deer, elk, antelope and bighorn sheep by habitat types and seasons in the Trickle Mountain Wildlife Habitat Area and to identify opportunities for habitat improvement and management.

B. Specific Study Objectives:

1.) Determine forage use by mule deer, elk, antelope, bighorn sheep and domestic livestock by habitat sites and season in the Trickle Mountain Area. Determine diet overlap and potential for competition. Determine gross forage carrying capacity for all ungulates.

2.) Develop a model that will define alternative forage allocations for big game and livestock from the above data.

3.) Propose potential habitat improvements and management that will produce alternative carrying capacities for big game and livestock simultaneous with ecosystem integrity and environmental quality based on information obtained during the study. These will include, but not be limited to:

a.) vegetative manipulation
b.) controlled burning
c.) fencing
d.) seeding and planting
e.) livestock grazing systems; and
f.) big game harvest, trapping and transplanting

III. PROCEDURES

A. General

This report summarizes work done on the project from October 1, 1978 through March 31, 1979.

Field work on the project has continued according to the expanded proposal, i.e. food habits and distribution data for all ungulates on the range have been collected every 2 weeks for the entire period.

Allen Cooperrider collected data in the field through December 1978 and in January, Scott McCollough moved to Saguache and has been spending full time in the field on the study area.

A crew of four C.S.U. students has been hired to conduct SVIM type range work for the summer. They will be working under the supervision of Scott Hoover who worked on the project last summer. Gary Glueckert, Tom Lankenau and Becky Trentlage have been working part time on coding and keypunching of the food habits and habitat use data.

Several presentations on forage allocation and on the project have been made by Allen Cooperrider including ones to the BLM Wildlife Workshop in Boise, to the Cañon City District Office, to a joint meeting of the BLM, U.S. Forest Service, and Colorado Division of Wildlife, in addition to several informal seminars and presentations at C.S.U.

B. Data Collection

1.) Habitat Use. An additional 432 observations of groups of wild ungulates have been made. Beginning in January 1979 a special effort has been made to measure and record how far bighorn sheep are feeding from "escape cover."

Characteristics of foraging areas and of escape terrain used by bighorn during winter and spring are being recorded. For these areas, vegetative type, aspect, slope and distance to water are noted. Distance of foraging areas to escape terrain and dimensions of cliffs used for escape are also being measured. These data will be used in identifying existing and potential winter-spring ranges of bighorn, a necessary part of analyzing the potential for forage competition between bighorns and cattle.

2.) Food Habits. Ten fecal samples have been collected from each of the wild ungulate species for each 2-week period from October 1, 1978 through March 31, 1979 and submitted to the Composition Analysis Laboratory at Colorado State University.

3.) Forage Production. A five man crew has been hired to finish the SVIM vegetation survey this summer. Under the expanded contract all of the BLM lands within the study area will be sampled. Processing of this data will be done at the Denver Service Center.

4.) Snow Measurements. Snow depths were recorded at 35 stations throughout the study area to test for correlation with snow measurements taken at the Saguache Airport. The stations have been chosen to represent various elevations, slopes, exposures, and vegetative types. These data will be used in the simulation model to predict when a habitat site is unavailable to wild ungulates due to snow conditions.

C. Data Analysis

1.) Habitat Use. No further analysis of the 1978 observation data has been made. Bighorn sheep observations for 1979 are being tabulated by habitat site and aspect.

2.) Food Habits. All 1978 food habits data have been punched on cards and stored on disc files for access on the C.S.U. Cyber 172 computer. Two major FORTRAN programs have been written and debugged to analyze this data, one for the domestic livestock and one for the wild ungulates. These programs allow the user to access the data and obtain rapid summaries and statistics of the food habits by species, period, season, or combinations of the above.

3.) Forage Production. Analysis of the SVIM data has been postponed until the BLM Denver Service Center gets their SVIM analysis system operational.

D. Forage Allocation Model

Work on the forage allocation model was begun in January and we expect to have a working model by the fall when the input data on forage production will be available.

IV. RESULTS AND DISCUSSION

Results are available on fall and winter distribution of the wild ungulates and on year round food habits of both wildlife and livestock species.

A. Fall and Winter Distribution 1978-1979

The winter of 1978 to 1979 was far more severe than the previous winter being characterized by early snowstorms in November and December, and consistently cold temperatures which resulted in a prolonged period of relatively deep snow on the ground.

All five wild ungulate species were essentially concentrated on winter range by the beginning of December. The pattern of range use was similar to that of 1977-78 except that the animals were concentrated for a longer period of time.

Bighorn Sheep. The Colorado Division of Wildlife's two feeding stations along Saguache Creek north of the Dabney Ranch heavily influenced the distribution of bighorns. Twenty observations were made in this area during January to early March when feeding was terminated. Mean group size was 14 with a range of 1 to 31. As indicated by observations made in early February, Ford Creek and Poison Gulch are probably other major winter ranges of bighorns. A group of four sheep, three ewes and a lamb, was regularly observed from Highway 114 near the Ward Ranch during February and March. The sheep came within 50 m of the highway.

Dispersal to late winter/early spring ranges was noted in mid-February. Areas utilized include Lone Tree Gulch, Middle Creek, cliffs along the first 2 km of Jack's Creek road, and a mountain in section 8, T45N, R6E. On March 21, an ear tagged ram (No. 7) was observed along Middle Creek, the first marked sheep seen in this area.

During February-March, 1979, bighorns foraged primarily in habitat with blue grama (Bouteloua gracilis) vegetative types on west or southeast aspects (Table 1). These areas were usually free of snow. Slopes on five foraging areas averaged 23 degrees, ranging from level to 35 degrees. Distance from foraging sheep to escape terrain was paced for nine observations and ranged from 38 to 131 m, averaging 88 m.

Escape terrain consisted of cliffs or rocky areas with slopes of 45-90 degrees and little vegetation. Three cliffs used as escape terrain averaged 10 m high; one was 112 m long. Additional areas of escape terrain have been identified but have not yet been measured.

Pronghorn Angelope. Pronghorn concentrated in basins located in sections 7 and 8, T45N, R6E during January and February. They were seen feeding on shrubs in areas with 30 to 50 cm of soft snow. Group size ranged from 1 to 28 with a mean of 15. A small herd of 6 animals was observed in Alkalai Gulch. In early March, pronghorn moved to snow-free areas around Lone Pine Reservoir and Chico Gulch.

Mule Deer. Mule deer were found east of Sheep Creek throughout the study area. Most observations were made along Jack's Creek, Middle Creek, and Lone Tree Gulch.

Elk. Elk were observed during January-March on east-facing slopes along Middle Creek with major concentration in the Bear Creek area. Mean group size was 10 with a range of 3 to 21. Elk were also seen in Poison Gulch and along south-facing slopes in Lone Tree Gulch. As snow melted off slopes surrounding Alkalai Gulch elk utilization increased in that area.

B. Food Habits

Year round food habits of all four wild ungulates on the range are summarized below. In addition, livestock food habits for each period in which the animals were on the range has been analyzed.

Bighorn Sheep. Fecal analyses suggest that bighorns are relying heavily upon browse for most of the year although large amounts of grass are eaten from May to early July (Figure 1). The single most important plant in the diet is fringed sage (Artemisia frigida).

Todd (1972) found fringed sage to be a common species in the diet of Rocky Mountain bighorn and stated that "future investigations into the use of fringed sage and its relationship to Rocky Mountain bighorn nutrition may reveal some interesting facts.

In late spring and summer, grasses and grasslike plants become increasingly important in the diet. The most common genera in the diet are fescue (Festuca spp.), muhly (Mulenbergia spp.), grama (Bouteloua spp.), sedges (Carex spp.) and rushes (Juncus spp.)

The low percentage of forbs in the diet may be due to a deficiency of palatable forbs on the range or it may be because of the fecal analysis technique. Fecal analysis has been reported to underestimate forbs when compared to data collected by esophageal fistula (Vavra et al. 1978). If there is in fact a lack of palatable forbs on the range it may be due to the dry winter and spring conditions in 1978 or it may be a chronic condition, perhaps due to past grazing practices. Range surveys this spring and summer following a wet spring should aid in determining if a dry spring was responsible for this phenomena.

Pronghorn Antelope. As with sheep, pronghorn relied heavily upon browse year round (Figure 2). Similarly, Artemisia spp. is the single most important species. As there is only negligible amounts of any other sagebrush species on the winter range, fringed sage is undoubtedly the species being eaten. On spring and summer ranges, big sagebrush is also common and they may be eating substantial amounts of it. Other important species include saltbush (Atriplex spp.), rabbitbrush (Chrysothamnus spp.), winterfat (Ceratoides lanata) and cinquefoil (Potentilla spp.)

The pronghorn diets also appear to be low in forbs for the spring and summer. Baker (1953) and Beale and Smith (1970) found that forbs represented 86 percent or more of pronghorn diets during summer. Yoakum (1979) stated that the percent of forbs in the diet of the pronghorn on Trickle Mt. as reported here is typical of a herd on depleted range. As discussed with the sheep food habits, the low percentage of forbs in the diet may be due to the dry spring or to other factors.

Mule Deer. Mule deer relied heavily upon browse at all seasons (Figure 3) and, like antelope, eat grass only when it is green and succulent. Important winter browse species include fringed sage, rabbitbrush, saltbush and winterfat. During the most severe periods of the winter deer ate substantial amounts of conifers. For example, during the last 2 week period of the year (December 17-31, 1978) fecal analysis indicated a diet of 27% juniper (Juniperus spp.), 11% pine (Pinus spp.), and 16% Douglas fir for a total of 54% conifer.

The single most important summer browse species was willow (Salix spp.). This may not be typical of all the deer on the range, however. The only area where deer were found during summer in high enough densities to collect fecals was along Saguache and Middle Creek where willows grow in abundance. Therefore, the diets of the deer occupying higher elevation summer range may be substantially different. It appears that deer are eating leaves as opposed to twigs of willow and therefore conventional browse utilization surveys designated for winter browsing would not detect this use.

Elk. Elk food habits are the most flexible of those reported here, changing from 85% browse in mid-winter to 90% grass in early spring (Figure 4). Important browse species in the diet include fringed sage, saltbush, winterfat, rabbitbrush and buffalo berry (Shepherdia spp.)

Major grass and grasslike species included fescues, muhlys, bluegrasses (Poa spp.), and sedges.

Elk tended to feed from late spring to fall in riparian areas along small creeks and wet meadows. They would feed in these areas until cattle were moved in when they would move to higher elevations. This pattern of avoidance of cattle by elk has been reported from several other areas (Mackie 1976, Knowles 1975). Similarly when forage at higher elevations became mature elk would move back down onto smaller creeks at lower elevations where succulent vegetation was available. The elk food habits for this period reflected this preference for moist areas with plants such as sedges, cinquefoil, and buffalo berry being well represented in the diet.

Livestock. An extensive analysis of the livestock food habits data has not been conducted. However, a few preliminary observations are of interest. Both cattle and horses ate primarily grass in spring and summer. However, on certain allotments up to 20% of the diet was winterfat. In the fall, saltbush and fringed sage were also found in the diets in amounts up to 15 percent for each species.

Food habits of cattle for the same period on different allotments are often significantly different even on adjacent allotments with similar vegetation types and stocking rates. The implication of this is that food habits for a general area may not be of great value in predicting what animals on a specific allotment are eating and that site specific data are needed. A similar pattern for wildlife has been observed, i.e. food habits for the same period and species are quite different from one part of the range to another, but livestock data provide better documentation of this phenomena.

V. LITERATURE CITED

Baker, T. 1953. Antelope movement and migration studies. Wyo. Wildl. 17(10):31-36.

Beale, D. M. and A. D. Smith. 1970. Forage use, water consumption and productivity of pronghorn antelope in western Utah. J. Wildl. Manage 34(3):570-582.

Knowles, C. J. 1975. Range relationships of mule deer, elk and cattle in a rest rotation grazing system during summer and fall. M.S. Thesis, Montana State Univ., Bozeman. 111 pp.

Mackie, R. J. 1970. Impacts of livestock grazing on wild ungulates. Trans. North Am. Wildl. Cpnf. 43:462-476.

Todd, J. 1972. A literature review on bighorn sheep food habits. Colo. Div. Game, Fish and Parks, Spec. Rept. No. 27. 21 pp.

Vavra, M., R. W. Rice, and R. M. Hansen. 1978. A comparison of esophageal fistula and fecal material to determine steer diets. J. Range Manage. 31(1):11-13.

Yoakum, J. 1979. Pers. Communication.

Table 1. Characteristics of 22 bighorn foraging areas, February-March, 1979, at Trickle Mountain Management Area.

Habitat Site	Percent of 22 Observations	Aspect	Percent of 22 Observations
Blue grama	73	W	32
Blue grama/pinque	5	SW	9
Rabbitbrush/blue grama	5	S	9
Mountain shrub	5	SE	36
Sparse pinyon-juniper	9	E	9
Rocks	5	NE	5

Figure 1. Percent relative density of forage classes in fecal samples from bighorn sheep, Trickle Mountain, Colorado, 1978.

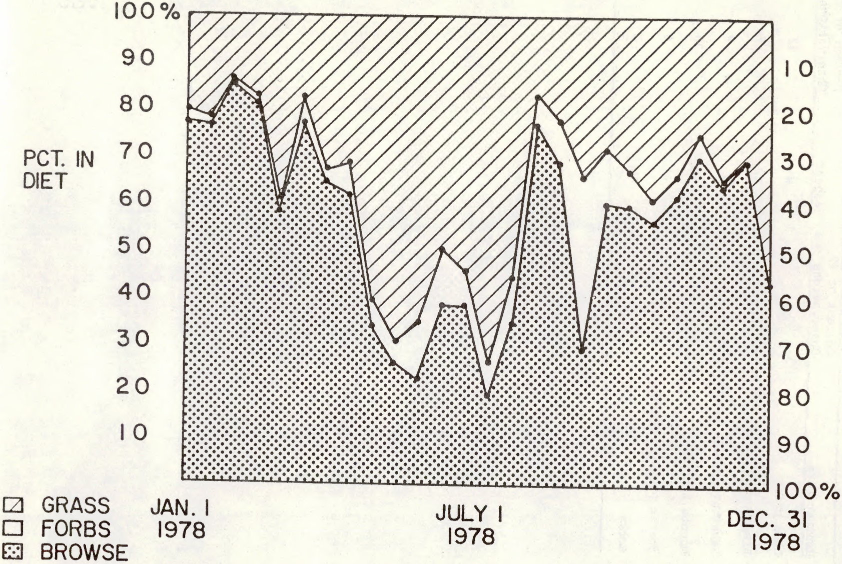


Figure 2. Percent relative density of forage classes in fecal samples from pronghorn antelope, Trickle Mountain, Colorado, 1978.

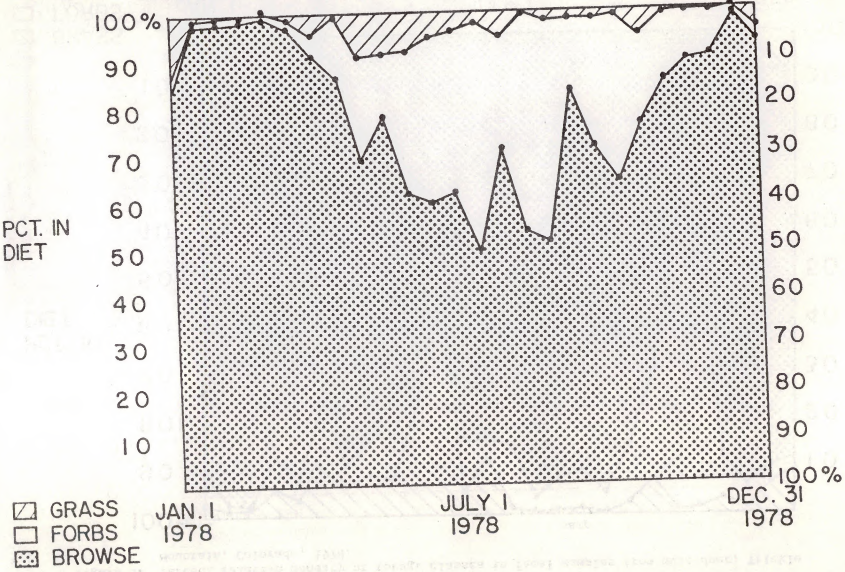


Figure 3. Percent relative density of forage classes in fecal samples from mule deer, Trickle Mountain, Colorado, 1978.

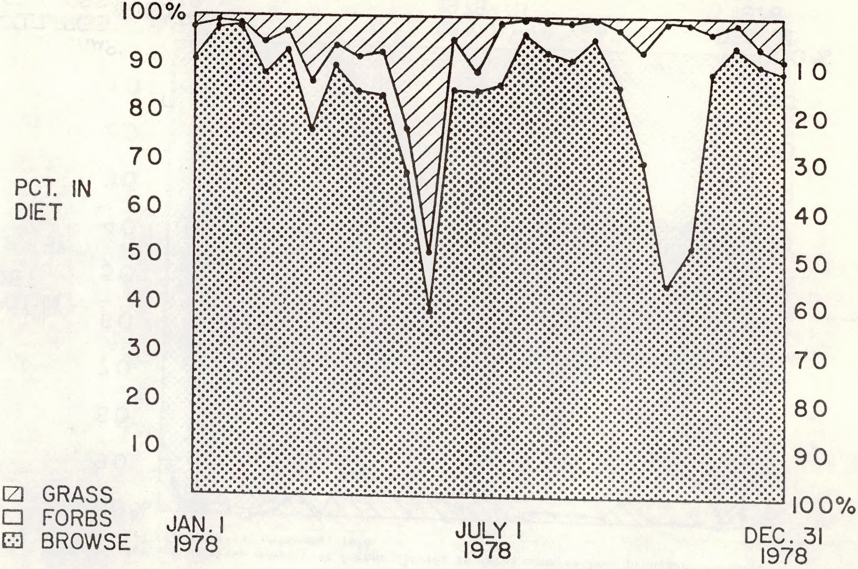
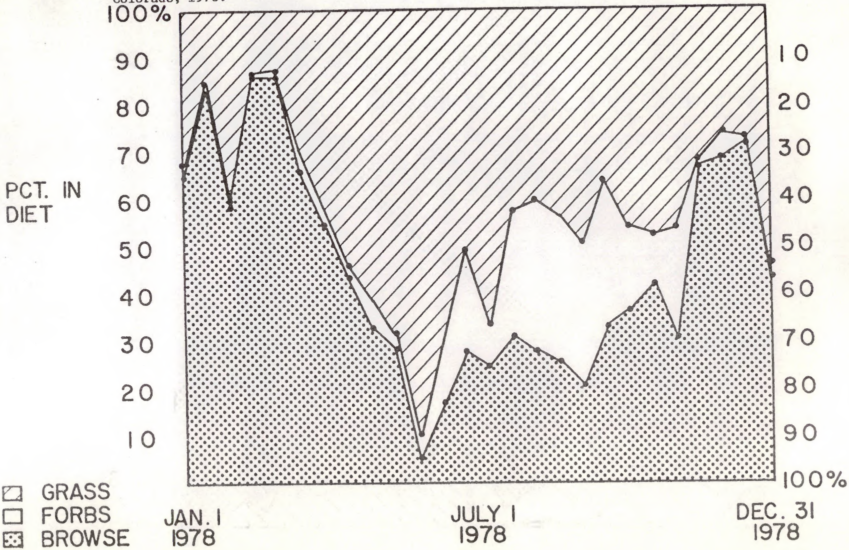


Figure 4. Percent relative density of forage classes in fecal samples from elk, Trickle Mountain, Colorado, 1978.



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